The REGIMPACT indicators 2018 vintage: Details on the methodology employed for calculating the 1975-2018 time series

OECD

Table of contents

Tables

Figures

Boxes

The REGIMPACT indicator: Methodology for calculating the 1975-2018 time series

Introduction

1.   In 1998, the OECD developed a set of indicators of product market regulation (PMR) in order to measure a country's regulatory barriers to competition and to track reform progress over time. This set included an Economy-wide PMR indicator and a group of indicators that measure regulation at the sector level in key network and service industries, which are referred to as PMR Sector indicators. These indicators have been updated every 5 years since.

2.   Another set of indicators, referred to as REGIMPACT, was also developed to measure the potential costs of regulatory constraints to competition captured by the PMR Sector indicators on other industries that use the output of these sectors as intermediate inputs in the production process.

3.   In this note, we explain how the REGIMPACT indicators are calculated. We start by explaining more in details the content and structure of the PMR Sector indicators. We then explain how we derive the REGIMPACT indicators from the PMR Sector indicators.

The PMR Sector indicators

4.   Until 2013, the PMR Sector indicators covered 3 network industries; energy (comprising electricity and natural gas), transport (by road, rail, and air) and communications (including both telecommunications and post). For this reason, they were also referred to as ETCR indicators.

5.   For these indicators, the OECD calculated not only the values every 5 years, but the OECD also reconstructed the values for all the years between these 5-year updates. The OECD also backcasted the values to 1975. This was done by collecting the necessary data from a wide variety of sources, including publications of the OECD and a range of other institutions. Hence, for the ETCR indicators there exist a time series that span from 1975 to 2013.

6.   At the time of the 2018 update, the OECD performed a review of the content and structure of all the PMR indicators, including the PMR Sector indicators for network industries. This was undertaken to ensure that they maintain their relevance in the context of evolving insights from economic theory, modifications in the economic and business environment, and changes in the practice of regulation.

7.   This review led to a number of changes. Those that most affected the PMR Sector indicators for network industries, are: i) the addition of the water transport sector and ii) the inclusion of the long-distance transport of passengers by coach in road transport. In addition, iii) the indicators for Telecommunications was considerably enriched and was renamed E-communications to highlight the greater importance given in it to data services. Moreover, iv) the regulatory framework for the fixed and mobile sectors is now assessed separately, since competition and regulatory issues in these two segments began to diverge due

to differences in technology and in the development of the two sectors. In addition, v) the Post sector is no longer included as this sector has lost regulatory and economic relevance over the past years.

8.	Last, but not least, vi) the content of the PMR sector indicators for network industries has been enriched. Until 2013, these indicators only included a subset of the information relative to the sectors they covered that was collected through the PMR questionnaire. In the last vintage, the OECD decided to include all the information on these sectors that was collected through the PMR questionnaire in order to provide a more complete overview of these sectors' regulatory environment. In addition, the 2018 PMR questionnaire includes a number of new questions that considers recent regulatory developments in these industries.

9.	More details on the changes to the PMR Network Sectors indicators can be found in (Vitale, C., et al. (2020)), which is available on the OECD PMR webpage.

10.	As a result of this review, the 2018 vintage of the PMR Sector indicators for network industries still assess 3 industries, but these are now Energy, Transport and E-communications, and their content has changed.

11.	Figure 1 below shows the structure of these indicators. There is an indicator for each sector contained in the 3 industries (marked in light blue). The average of these sectors forms the industry indicator (each marked in dark blue). The overall indicator for all network industries (marked in green) is an average of the eight disaggregated sector indicators (and not of the three industry ones). This ensures that each of the eight sectors has the same weight in the overall indicator.

Figure 1. Structure of the PMR indicators for Network Sectors (2018 update)
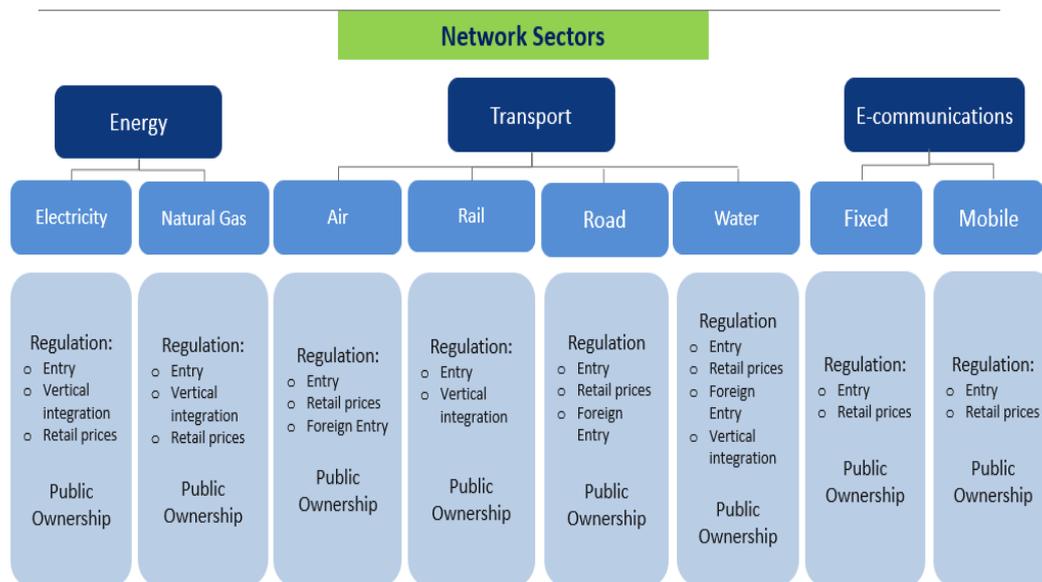
12.	As a result of these changes, the PMR Sector indicators included in the 2018 vintage are not comparable with previous ones.

13.	However, only for the network industries, the OECD has developed a methodology to "connect" the two sets of indicators, the "old" ETCR indicators, for which values exist between 1975 and 2013, and the "new" PMR sector indicators for network industries developed in 2018. As a result, a harmonized time series for the PMR Sector indicators is available from 1975 to 2018. More details on this methodology can be found in the note "Methodology for calculating the 1975-2018 Time series", which is available on the PMR webpage.

The REGIMPACT indicator

14. The REGIMPACT indicators measure the relevance that the regulatory framework in the network sectors covered by the PMR Sector indicators has for other industries (see Conway and Nicoletti, 2006, for further details).

15. Given the large role of these non-manufacturing sectors as suppliers of intermediate inputs in OECD countries, regulations in these sectors exhibit "knock-on" effects felt across the whole economy.

16. The precise magnitude of these "knock-on" effects depends on:

- The extent of the regulatory constraints to competition that are present in the non-manufacturing sectors; and
- The importance of these sectors as suppliers of intermediate inputs to other sectors.

17. The PMR Sector indicators capture the first of these factors; the second factor is measured using total input-output coefficients derived from (harmonised) input-output tables[1], which provide a snapshot view of the purchases and sales of intermediate inputs between different sectors of the economy in a given year. Box 1 explains in more details how the REGIMPACT indicators are calculated.

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[1] An input-output table is a means of presenting a detailed analysis of the process of production and the use of goods and services (products) and the income generated in that production; they can be either in the form of (a) supply and use tables or (b) symmetric input-output tables. The OECD Input-Output database, measured in millions of US dollar, is used in the computation of the REGIMPACT indicators.

Box 1. How the REGIMPACT indicators are calculated

The REGIMPACT indicators are calculated using:

- the PMR sector indicators for network industries (PMRNetworkSector) and

- the total input-output coefficients (w), denoting total intermediate inputs of sector k from the non-manufacturing sector j:

$$REGIMPACT'_{c,k,t} = \sum_{j=1}^{n} PMRNetworkSector_{c,j,t} * w_{c,j,k}$$

where c denotes countries, k denotes sectors and j denotes non-manufacturing sectors.

Total input coefficients (w) are calculated as follows. If Y is a vector of industry gross outputs, D is a vector of demand for final goods, A is a matrix of technical coefficients—that is, the share of inputs from industry j used in producing one unit of output of industry k—and I is the identity matrix, then the basic relation between output and final demand can be expressed as:

$$D=(I-A)Y, \text{ or alternatively, } Y=(I-A)^{-1}D$$

In this equation $(I-A)^{-1}$ is the Inverse Leontief Matrix of the input-output coefficients and describes how many units of an industry's output have to be used at any stage of the value chain in order to produce one unit for final demand. The weights (w) used in the REGIMPACT equation are drawn directly from the Inverse Leontief Matrix of the input-output coefficients.

The REGIMPACT indicators computed with the above formula are normalised for all sectors and countries as follows:

$$REGIMPACT_{c,k,t} = (REGIMPACT'_{c,k,t} - Xmin) / (Xmax - Xmin)$$

Where Xmin = Minimum value of REGIMPACT' across all sectors and all countries

Xmax = Maximum value of REGIMPACT' across all sectors and all countries

This implies that all values are between 0 and 1 and that the REGIMPACT indicators can be compared across countries.

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18.   To calculate REGIMPACT indicators, the OECD uses data from input-output matrices for a given year that we shall refer to as 'reference year'. Hence, the input-output coefficients ($w_{j,k}$) used for the construction of the REGIMPACT indicators are constant over time. Therefore, the year to year changes in the REGIMPACT indicator for each country are due to the changes in the PMR Network Sector indicators. The advantage of such a choice is that changes in the indicator will reflect only changes in policies, but not in the input-output coefficients. To calculate the first set of the REGIMPACT indicators, the country-specific input-output coefficients (w) are used for each country. However, in empirical estimations, country-specific weights may give rise to endogeneity. For this reason, the OECD also produces a second set of the REGIMPACT indicators that use the same coefficients (set of weights) for all countries. In this indicator, the input-output coefficients obtained for the United States are used for each country[2]. Both sets of weights do not change over time and, as a result, they do not affect the dynamics of the indicators.

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[2]It should be also noted that the weighting scheme would not matter if the empirical analysis relied on panel regressions including country fixed effects as these take out the cross country variation in the data, including the level differences due to the different weights.

19.   The coverage of these indicators is linked to the industrial classification and the reference year used in the computation. In the other part of the above formula shown in Box 1, the PMR sector indicators (PMRNetworkSector) must also be calculated at the same level of sectoral aggregation (depending on the industrial classification). The next section will present in details the data used in the 2013 edition.

The 2013 Vintage

20.   When the OECD calculated the 2013 vintage of the REGIMPACT indicators, the (harmonised) input-output data for OECD countries (the $w_{j,k}$) existed at the 2-digit level of the ISIC rev. 3 classification. The Inverse Leontief Matrix of the input-output coefficients for years in the mid-2000s was deployed. Accordingly, the sector indicators (PMRNetworkSector) are mapped into the ISIC rev. 3 system as shown in Figure 2.

Figure 2. Correspondence between PMR sector indicators and input-output data from ISIC rev. 3
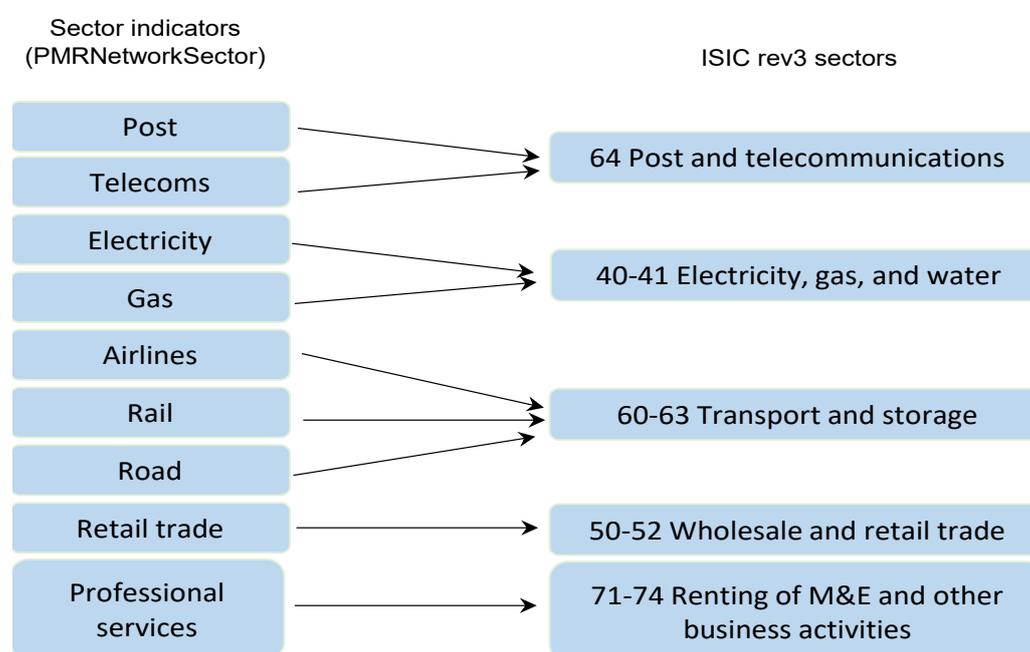
Note: If more than one of the sector indicators map into a given 2-digit ISIC sector then PMRNetworkSector $_{j,t}$ is calculated as a simple average of the constituent indicators.

21.   In the 2013 vintage, a set of four alternative measures of the 2013 REGIMPACT indicators were calculated for 37 sectors (manufacturing and non-manufacturing sectors) using 2-digit ISIC rev. 3 classification for OECD countries. The sectors covered are listed in Annex 1. The four variants of the 2013 REGIMPACT indicators are included in the 2013 database and are summarised in Table 1.

Table 1. The four measures of the REGIMPACT indicator of the 2013 vintage[3]

Country-specific weights for intermediate outputs	US weights for intermediate outputs
1. PMR sector indicators for network industries based on country weights	3. PMR sector indicators for network industries, based on US weights
2. PMR sector indicators for network industries and PMR sector indicators for service industries (retail distribution and professional services) based on country weights	4. PMR sector indicators for network industries and PMR sector indicators for service industries based on US weights

The 2018 Vintage

22.   The latest update of the PMR indicators, as mentioned above, was marked by the introduction of numerous changes in their content and structure. Nevertheless, the OECD constructed a time series of the PMR sector indicators for network industries available from 1975 to 2018. The same could not be done for PMR sector indicators for retail distribution and professional services, due to the difficulties encountered when trying to obtain the necessary data. Thus, only two of the four measures of the REGIMPACT indicators included in the 2013 vintage could be updated: those that rely on the PMR Sector indicators for network industries (i.e. measures 1 and 3 in Table 1 above).

23.   These measures were updated using two different sets of weights and input-output data:

- same weights and input-output data as in 2013 vintage

- same weights and input data as in previous vintages

24.   Hence, the 2018 vintage of the REGIMPACT indicators includes 4 different measures. These are listed in Table 2 presented at the end of the section.

25.   For the first two measures the OECD decided to use data for the year 2013 (the latest available). This was done to better reflect the current structure of the economy. However, the (harmonised) input-output data for OECD countries for the classification ISIC rev. 3 are no longer updated hence they do not exist for the year 2013.

26.   However, there exist input-output tables for the year 2013 based on the ISIC rev. 4 classification. Hence the OECD has calculated two measures of REGIMPACT indicators based on the classification ISIC rev. 4 that use 2013 as the reference year, one with country-specific weights and one with US weights. These two alternative measures have been calculated for 35 sectors (manufacturing and non-manufacturing sectors). The sectors covered are listed in Annex A. These two measures use the 2018 PMR sector indicators for network industries, which are mapped into the ISIC rev. 4 system as shown in Figure 3.

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[3] More details could be found in the OECD Economics Department Working Papers, (Égert and Wanner, 2016)

Figure 3. Correspondence between PMR sector indicators and input-output data from ISIC rev. 4
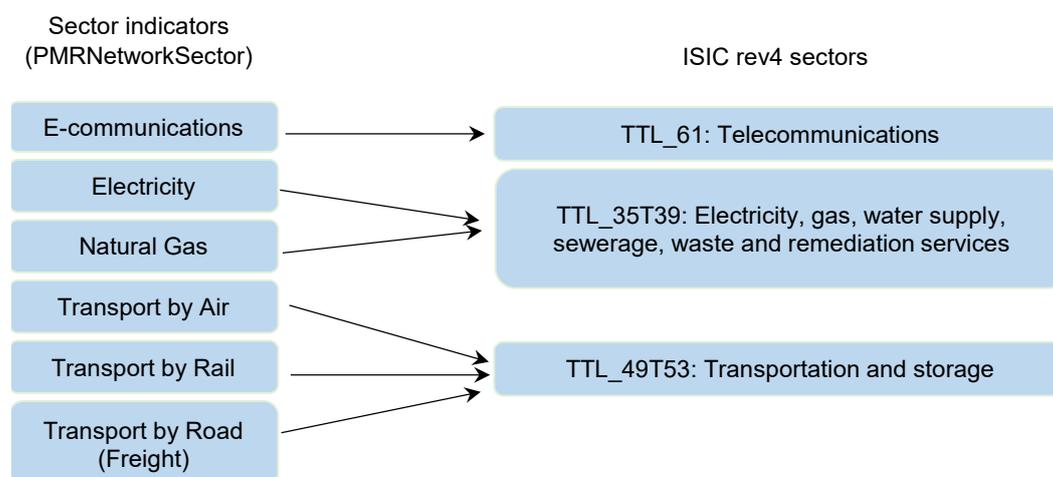
Note: If more than one of the sector indicators map into a given 2-digit ISIC sector then PMRNetworkSector $_{j,t}$ is calculated as a simple average of the constituent indicators.

27.   The other two measures rely on the same approach used to build the in the 2013 vintage, which relies on the 2-digit ISIC rev. 3 classification and uses input-output matrices from the mid-2000s. This approach has been replicated because it is the only one that permits to have a time series that can cover the whole period from 1975 to 2018. These two measures are based on the series of PMR sector indicators for network industries available for the period 1975-2018.

28.   These two measures will be different from the values published in the 2013 vintage, because they are based on the new time series of the PMR sector indicators for network industries. However, this method has allowed the OECD to have two sets of REGIMPACT inidcators that span from 1975 to 2018.

29.   The four alternative measures of REGIMPACT indicators are summarised in Table 2 below.

Table 2. The four measures of the REGIMPACT indicator included in the 2018 vintage

Country-specific weights for intermediate outputs	US weights for intermediate outputs
1. Time series reg_sect_csw_N Sector indicators for network industries Weights (w) derived from input-output data according to the classification ISIC rev4 Input-output data reference year, 2013	2. Time series reg_sect_usw_N Sector indicators for network industries Weights (w) derived from input-output data according to the classification ISIC rev4 Input-output data reference year, 2013
3. Time series reg_secte_csw_N Sector indicators for network industries Weights (w) derived from input-output data according to the classification ISIC rev3 Input-output data reference year, mid-2000s	4. Time series reg_secte_usw_N Sector indicators for network industries Weights (w) derived from input-output data according to the classification ISIC rev3 Input-output data reference year, mid-2000s

Bibliography

Conway, P. and G. Nicoletti (2006), "Product Market Regulation in the Non-Manufacturing Sectors of OECD Countries: Measurement and Highlights", OECD Economics Department Working Papers, No. 530.

Égert, B. and I. Wanner (2016), "Regulations in services sectors and their impact on downstream industries: The OECD 2013 Regimpact Indicator", OECD Economics Department Working Papers, No. 1303.

Vitale, C., et al. (2020), "The 2018 edition of the OECD PMR indicators and database: Methodological improvements and policy insights", OECD Economics Department Working Papers, No. 1604.

Annex A.

isic rev.3	industry_name	isic rev.4	industry_name
01-05	Agriculture, hunting, forestry and fishing		TTL_01T03: Agriculture, forestry and fishing
10-14	Mining and quarrying		TTL_05T06: Mining and extraction of energy producing products
15-16	Food products, beverages and tobacco		TTL_07T08: Mining and quarrying of non-energy producing products
17-19	Textiles, textile products, leather and footwear		TTL_09: Mining support service activities
20	Wood and products of wood and cork		TTL_10T12: Food products, beverages and tobacco
21-22	Pulp, paper, paper products, printing and publishing		TTL_13T15: Textiles, wearing apparel, leather and related products
23	Coke, refined petroleum products and nuclear fuel		TTL_16: Wood and of products of wood and cork (except furniture)
24	Chemicals and chemical products		TTL_17T18: Paper products and printing
25	Rubber and plastics products		TTL_19: Coke and refined petroleum products
26	Other non-metallic mineral products		TTL_20T21: Chemicals and pharmaceutical products
27	Basic metals		TTL_22: Rubber and plastics products
28	Fabricated metal products except machinery and equipment		TTL_23: Other non-metallic mineral products
29	Machinery and equipment n.e.c		TTL_24: Manufacture of basic metals
30	Office, accounting and computing machinery		TTL_25: Fabricated metal products, except machinery and equipment
31	Electrical machinery and apparatus n.e.c		TTL_26: Computer, electronic and optical products
32	Radio, television and communication equipment		TTL_27: Electrical equipment
33	Medical, precision and optical instruments		TTL_28: Machinery and equipment n.e.c.
34	Motor vehicles, trailers and semi-trailers		TTL_29: Motor vehicles, trailers and semi-trailers
35	Other transport equipment		TTL_30: Other transport equipment
36-37	Manufacturing n.e.c; recycling		TTL_31T33: Other manufacturing; repair and installation of machinery and equipment
40-41	Electricity, gas and water supply		TTL_35T39: Electricity, gas, water supply, sewerage, waste and remediation services
45	Construction		TTL_41T43: Construction
50-52	Wholesale and retail trade; repairs		TTL_45T47: Wholesale and retail trade; repair of motor vehicles
55	Hotels and restaurants		TTL_49T53: Transportation and storage
60-63	Transport and storage		TTL_55T56: Accomodation and food services
64	Post and telecommunications		TTL_58T60: Publishing, audiovisual and broadcasting activities
65-67	Finance and insurance		TTL_61: Telecommunications
70	Real estate activities		TTL_62T63: IT and other information services
71	Renting of machinery and equipment		TTL_64T66: Financial and insurance activities
72	Computer and related activities		TTL_68: Real estate activities
73	Research and development		TTL_69T82: Other business sector services
74	Other Business Activities		TTL_84: Public administration and defence; compulsory social security
75	Public admin. and defence; compulsory social security		TTL_85: Education
80	Education		TTL_86T88: Human health and social work
85	Health and social work		TTL_90T96: Arts, entertainment, recreation and other service activities
90-93	Other community, social and personal services		
95	Private households with employed persons		

Note: This table lists the set of distinct industries where the REGIMPACT indicators are available for both ISIC rev. 3 and ISIC rev. 4. It is not a correspondence table between the two industry classifications.